LENDING CLUB CASE STUDY

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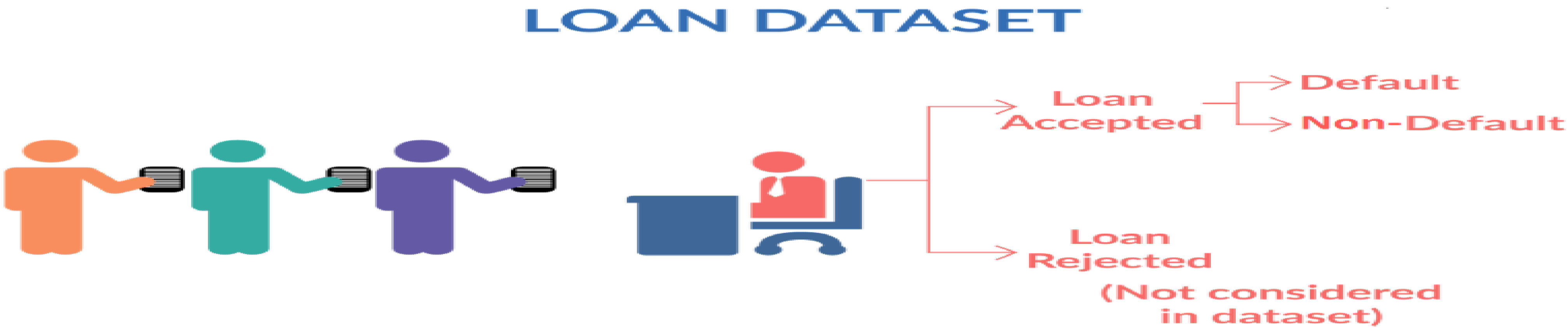
Problem Statement :

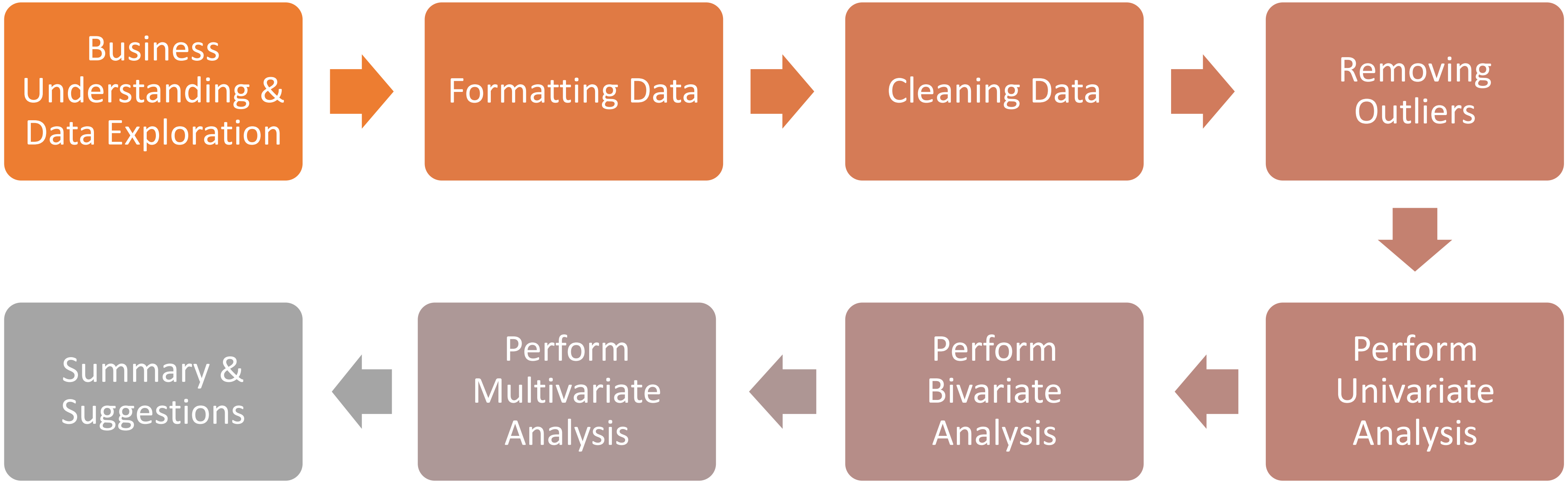
You work for a consumer finance company which specializes in lending various types of loans to urban customers. When the company receives a loan application, the company has to make a decision for loan approval based on the applicant's profile. Two types of risks are associated with the bank's decision:

- ➢ If the applicant is likely to repay the loan, then not approving the loan results in a loss of business to the company.
- ➢ If the applicant is not likely to repay the loan, i.e., he/she is likely to default, then approving the loan may lead to a financial loss for the company
- ➢ The data given below contains the information about past loan applicants and whether they 'defaulted' or not.
- ➢ The aim is to identify patterns which indicate if a person is likely to default, which may be used for taking actions such as denying the loan, reducing the amount of loan, lending (to risky applicants) at a higher interest rate, etc.

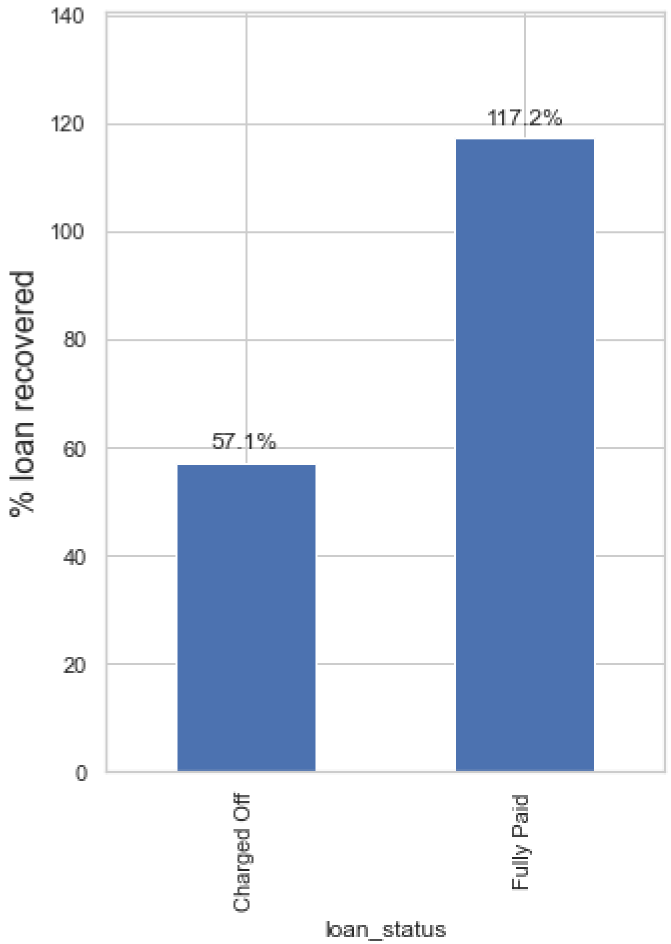


Understanding Overall Approach of the Analysis :

- Like most other lending companies, lending loans to ‘risky’ applicants is the largest source of financial loss (called credit loss).
- If one can identify these risky loan applicants, then such loans can be reduced thereby cutting down the amount of credit loss. Identification of such applicant's using EDA is the aim of this case study.

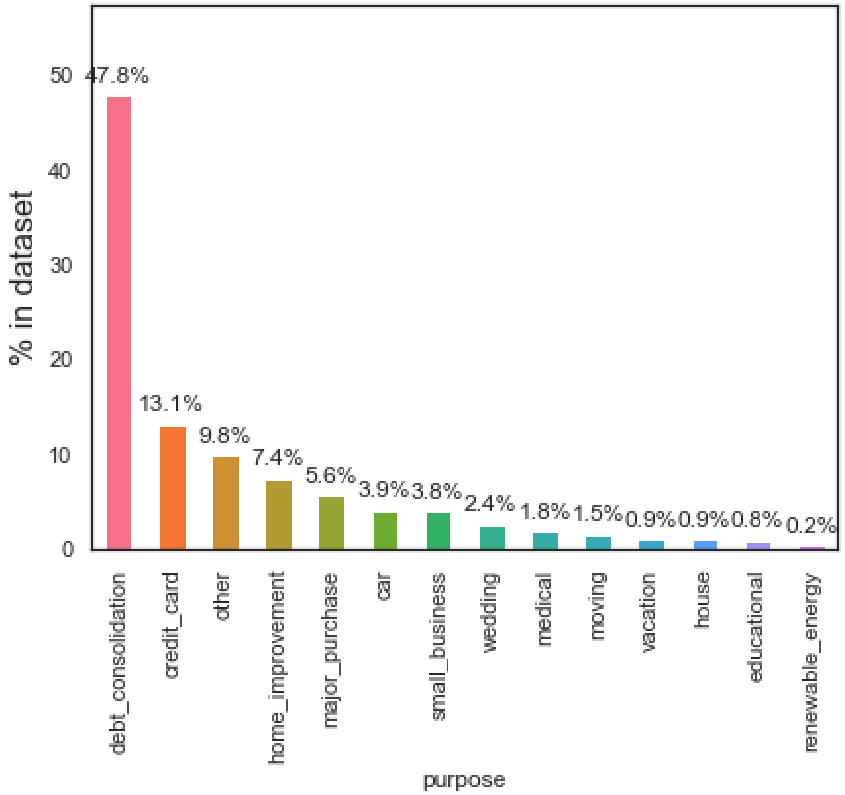


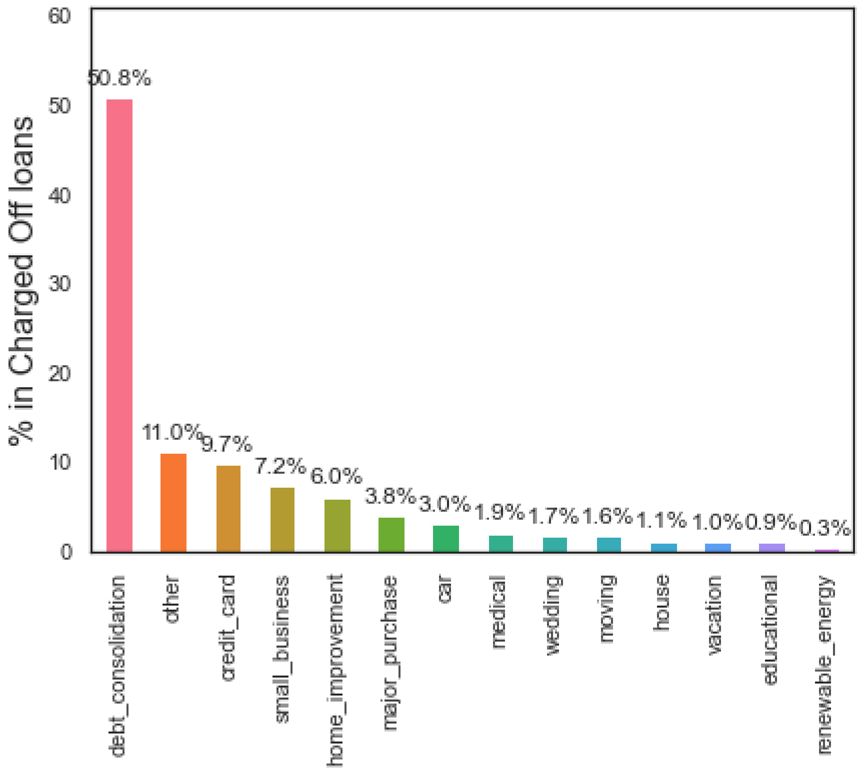
Understanding Overall Loan Status



- Lending Club only recovers 57% of the loan amount when loans are defaulted. On fully paid-up loans, the company makes 17% profit
- Approximately 14% of loans are defaulted basis analysis done on status of the loan repayment

Understanding Loans

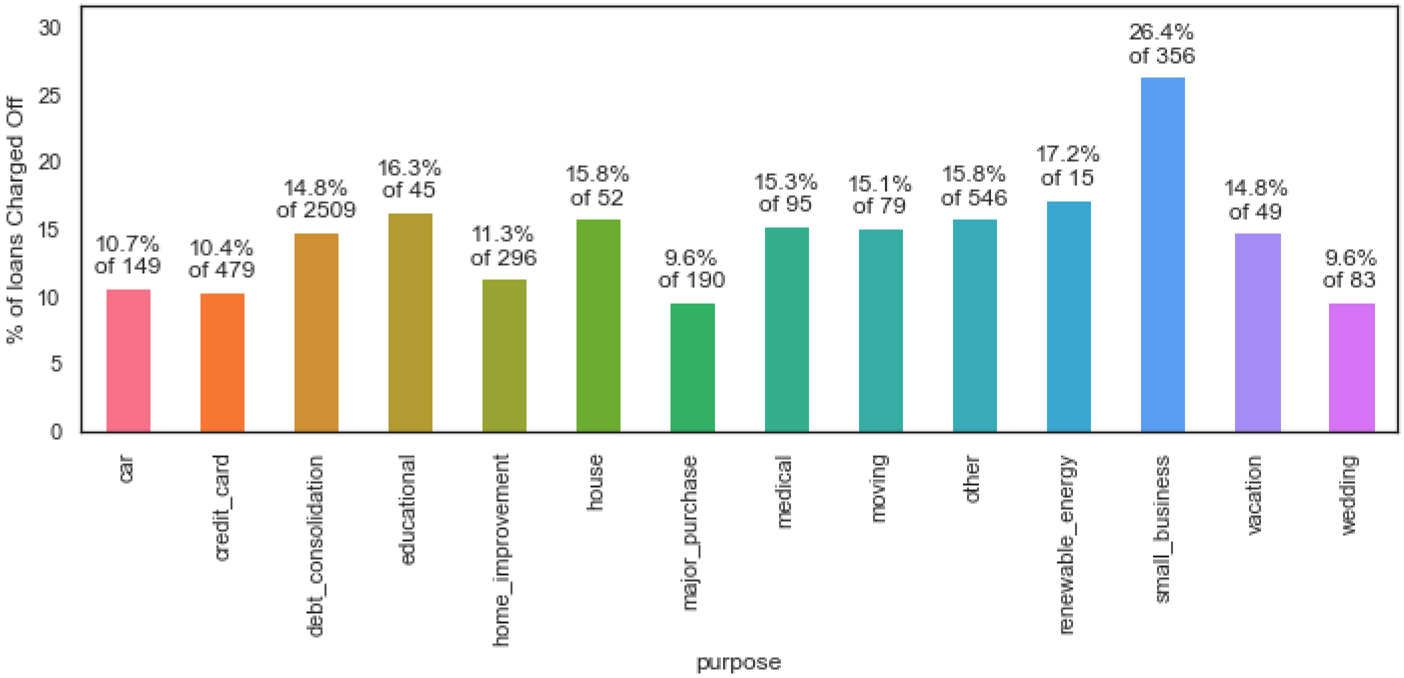




Purpose of Loans:

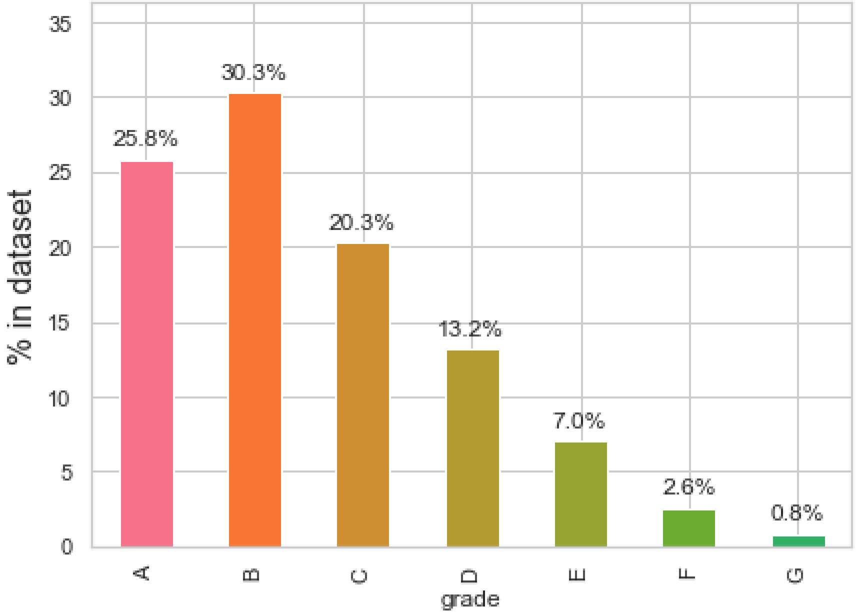
- Most of the loans were taken for the purpose of debt consolidation & paying credit card bill.
- Number of charged off count also high too for these loans.

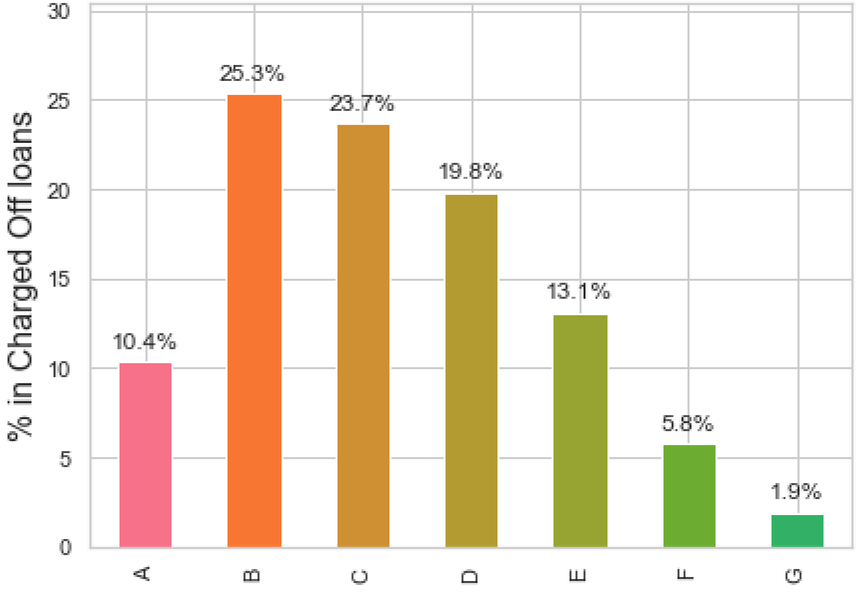
Understanding Purpose of Loans v/s Loan Charged Off Proportion :



- Small Business applicants have high chances of getting charged off. Since 26% of loans for small business are Charged Off. Making them the riskiest purpose.
- Renewable energy & Educational purpose loans have high % of Charged Off as compared to other categories.

Understanding Loans Basis Grades

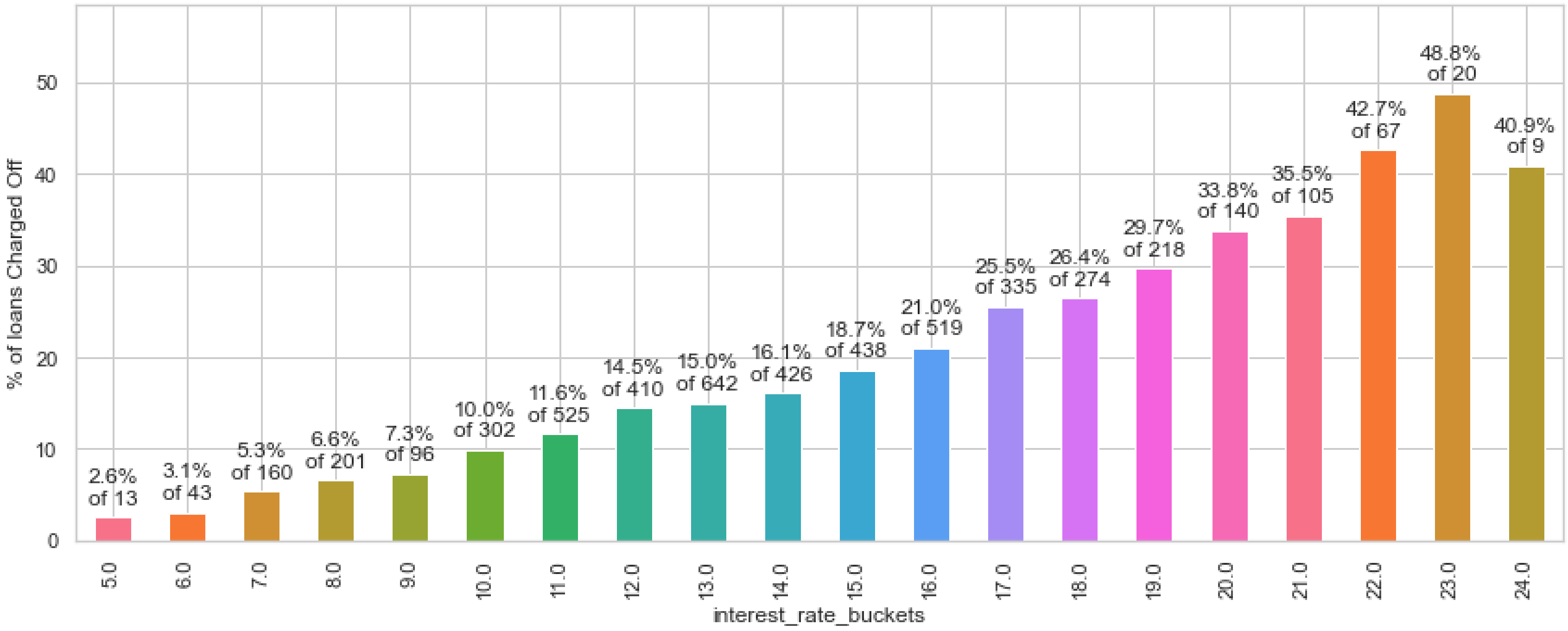




- ➢ Lower grades have higher incidence of defaults on loans when compared the grade with loan status defaulting.

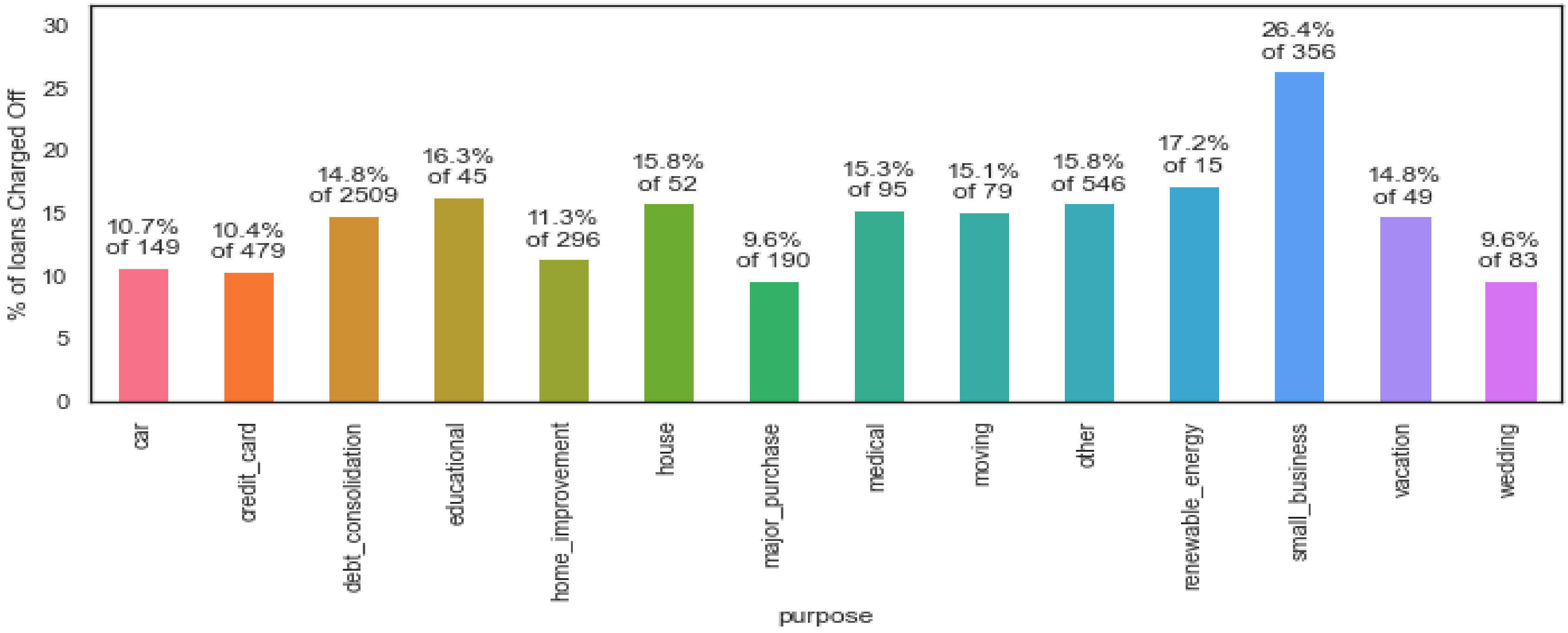
- ➢ Lending Club charges higher interest rates as the grade of loan becomes worse since lower grades (C-G) results more in Charged Off loans or in defaulting loan

Understanding Loans Basis Interest Rate Charged for Defaulting Loan Borrowers



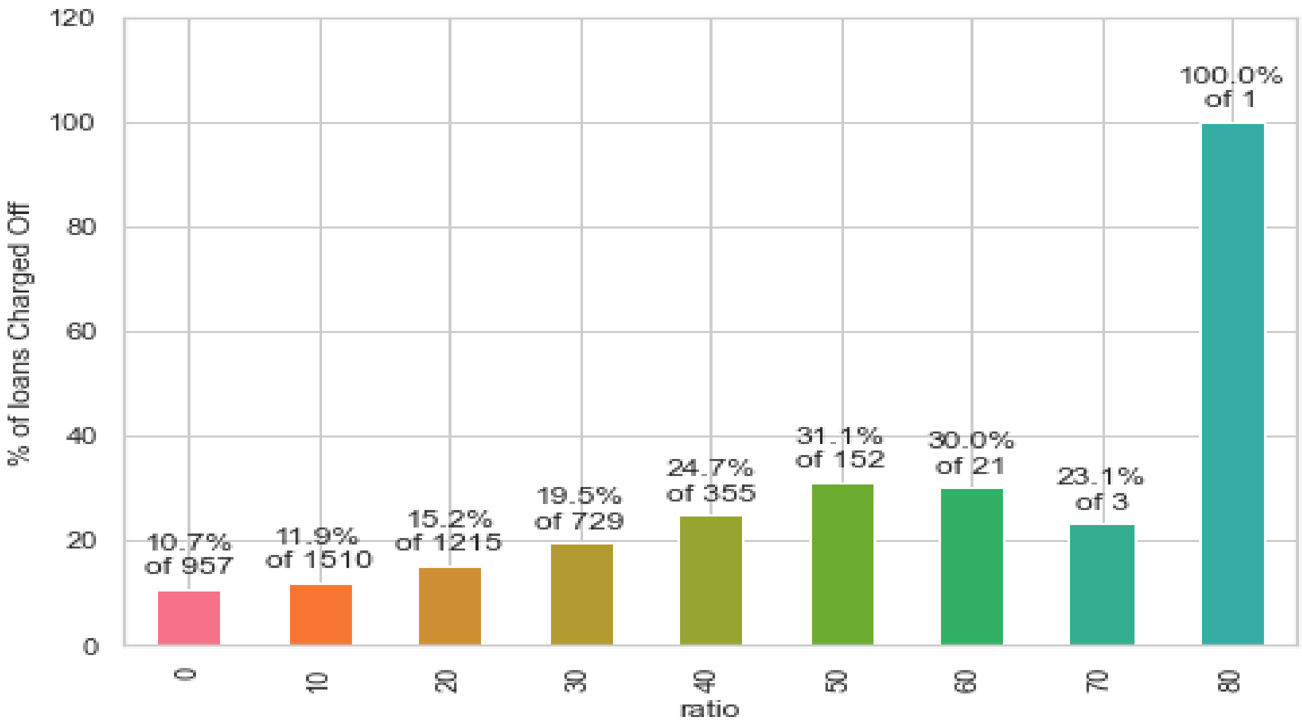
- Percentage of defaults increases monotonically with higher interest rates which mostly includes grades C-G which is again a driving factor for Charged Off loan as interest rate charged are high.

Understanding Defaults by Loan Purpose



- **26% of loans for small business are Charged Off. Making them the riskiest purpose for granting loan.**

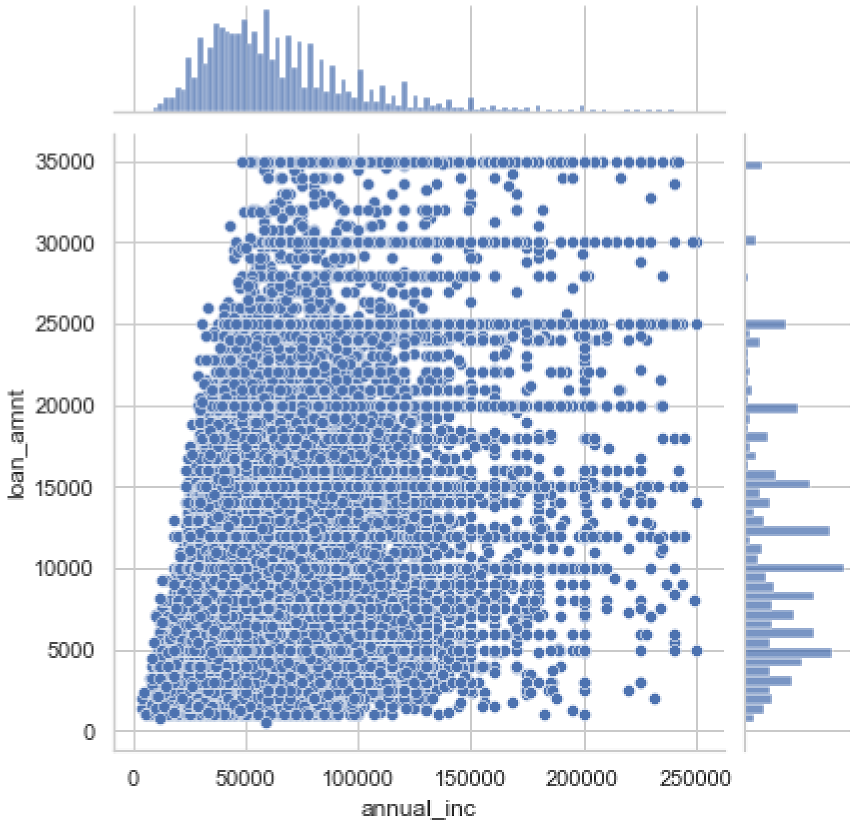
Understanding Defaults by ratio of loan amount to annual income



x-axis is the % of loan amount versus annual income

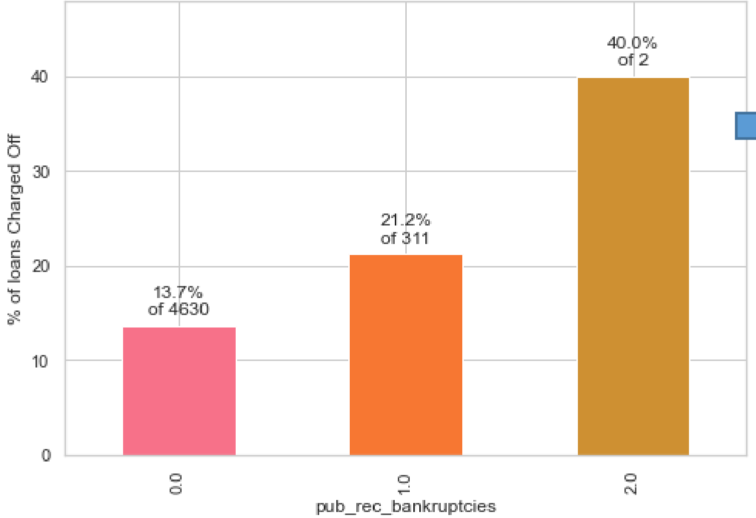
- If loan amount is less than 20% of annual income, defaults are low.
- Loan amounts of 30% of annual income or higher see a high rate of default

Understanding Defaults by ratio of loan amount to annual income

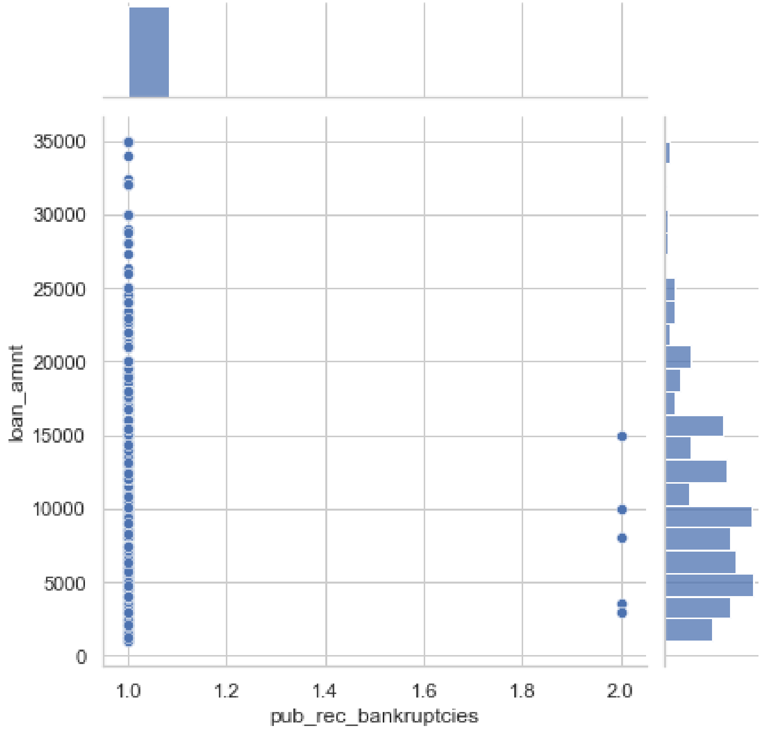


- There are people with average income lower than 50000 taking loans of 25000 or higher. These would be risky loans since they can increase the chances of defaulting on loans.

Understanding Defaults by prior bankruptcies

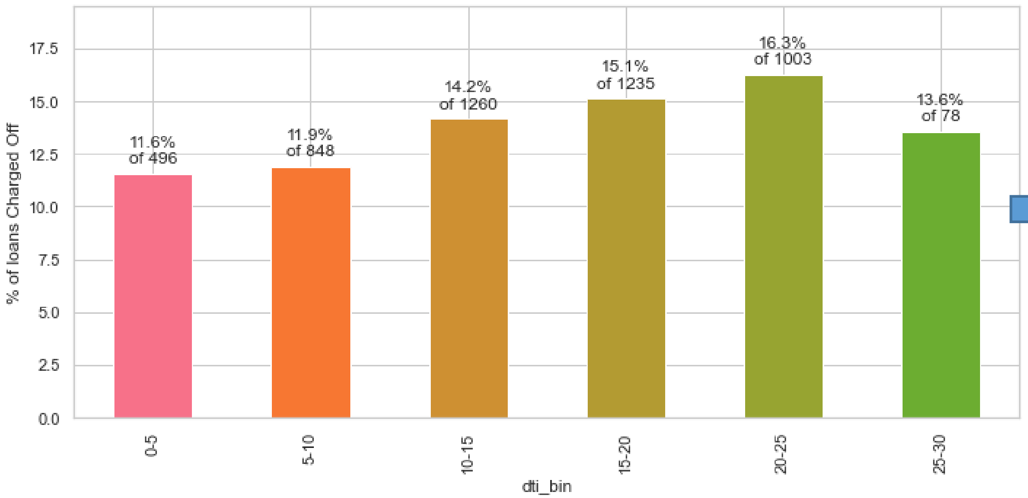


- The percentage of Charged Off loans is markedly higher when the borrower has a prior record of bankruptcy.
- 96% have no public record bankruptcies. 4% have 1 derogatory record.
- Having even 1 derogatory record increases the chances of Charge Off significantly.



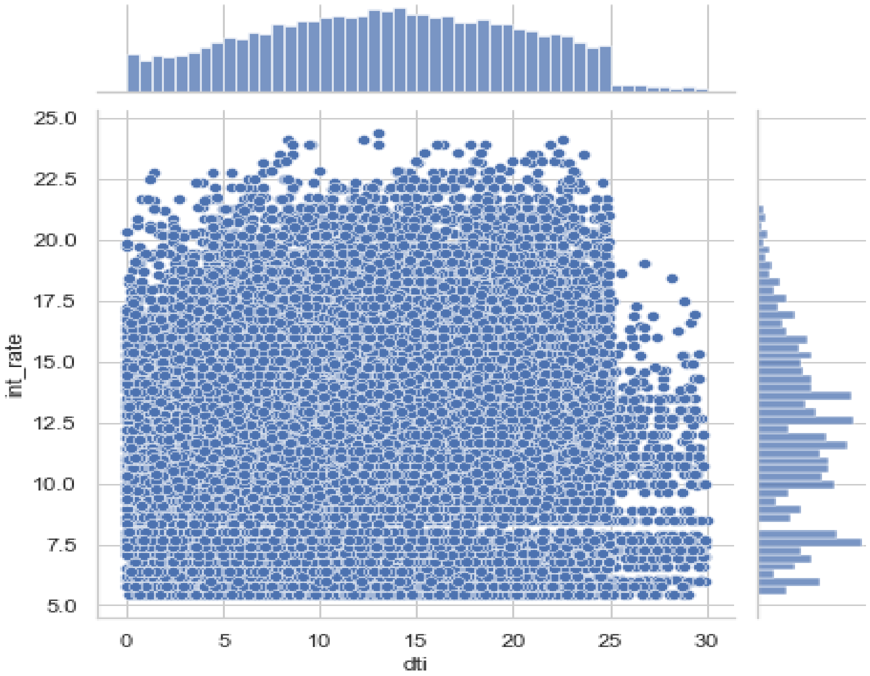
- High value loans have been extended to more than 0 prior record of bankruptcy hence the percentage of Charged Off loans is markedly higher when the borrower has a prior record of bankruptcy which was observed on previous analysis.
- High value loans should not be given to applicants having >0 prior bankruptcy records

Understanding Defaults by Debt-to-Income Ratio

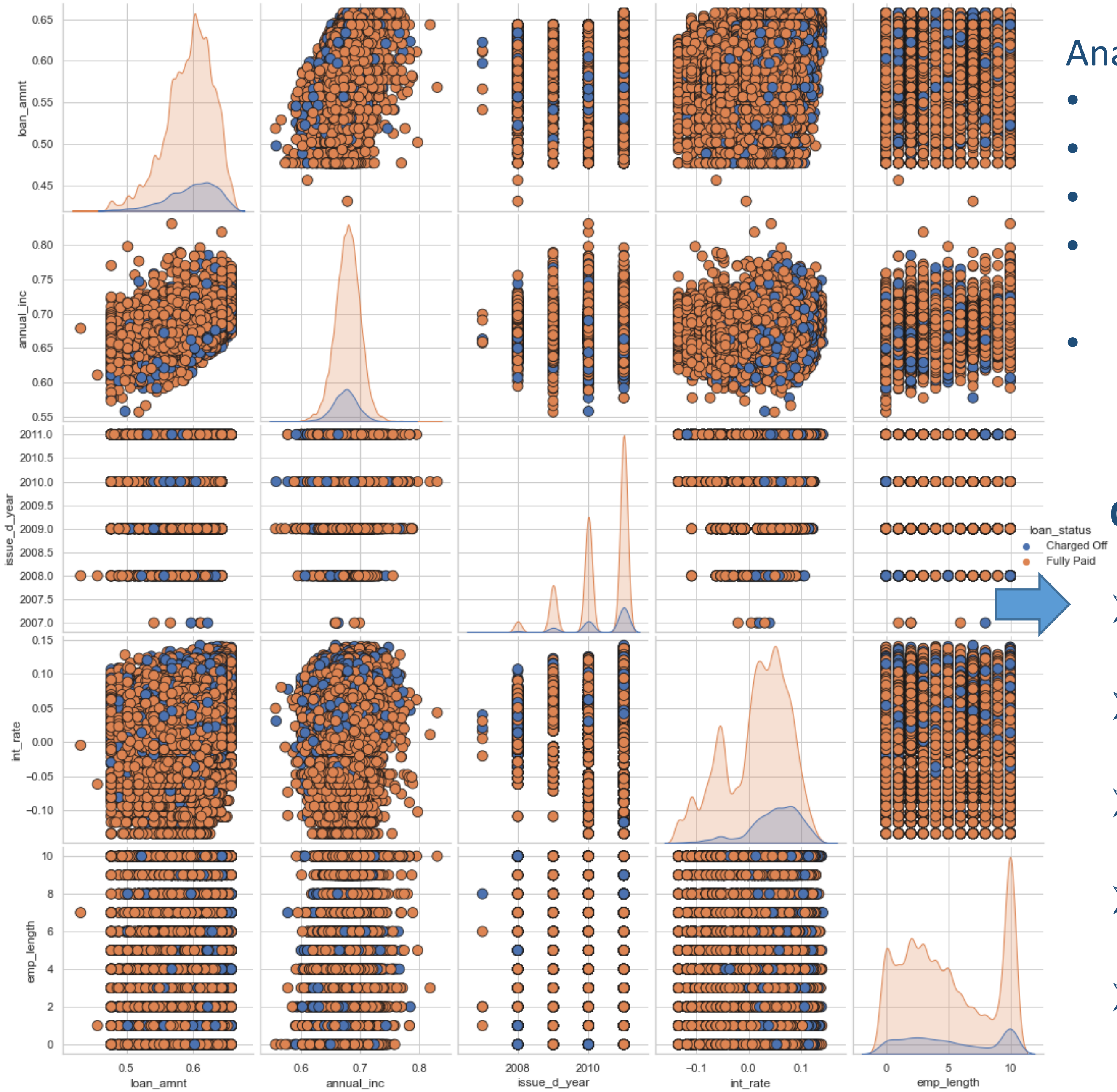


- Higher the debt-to-income ratio higher are the chances of loan being Charged Off
- When the dti or debt payment to income ratio is higher than 19, higher percentage of loans are Charged Off

- As observed earlier that higher the dti higher the chances of loan being Charged Off thus, higher interest rates should be charged for higher dti since it can be observed that int_rate charged on higher dti is less. This can curtail the risk of more Charged Off loans.



Understanding Multiple columns against each other



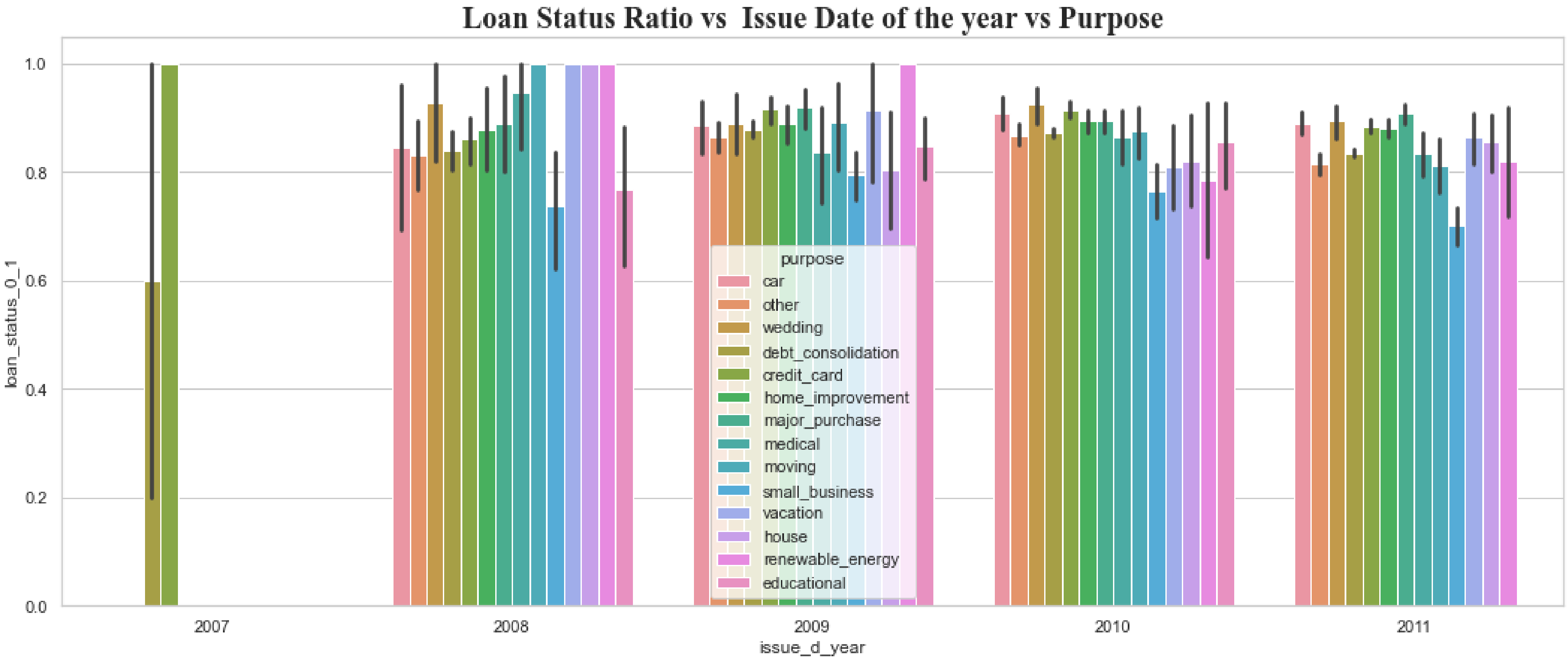
Analyzed the following columns in loan dataset:

- Loan Amount
- Annual Income
- Year when loan was taken
- Interest Rate at which loan was taken to each other
- Employment length in years of the borrower

Observations:

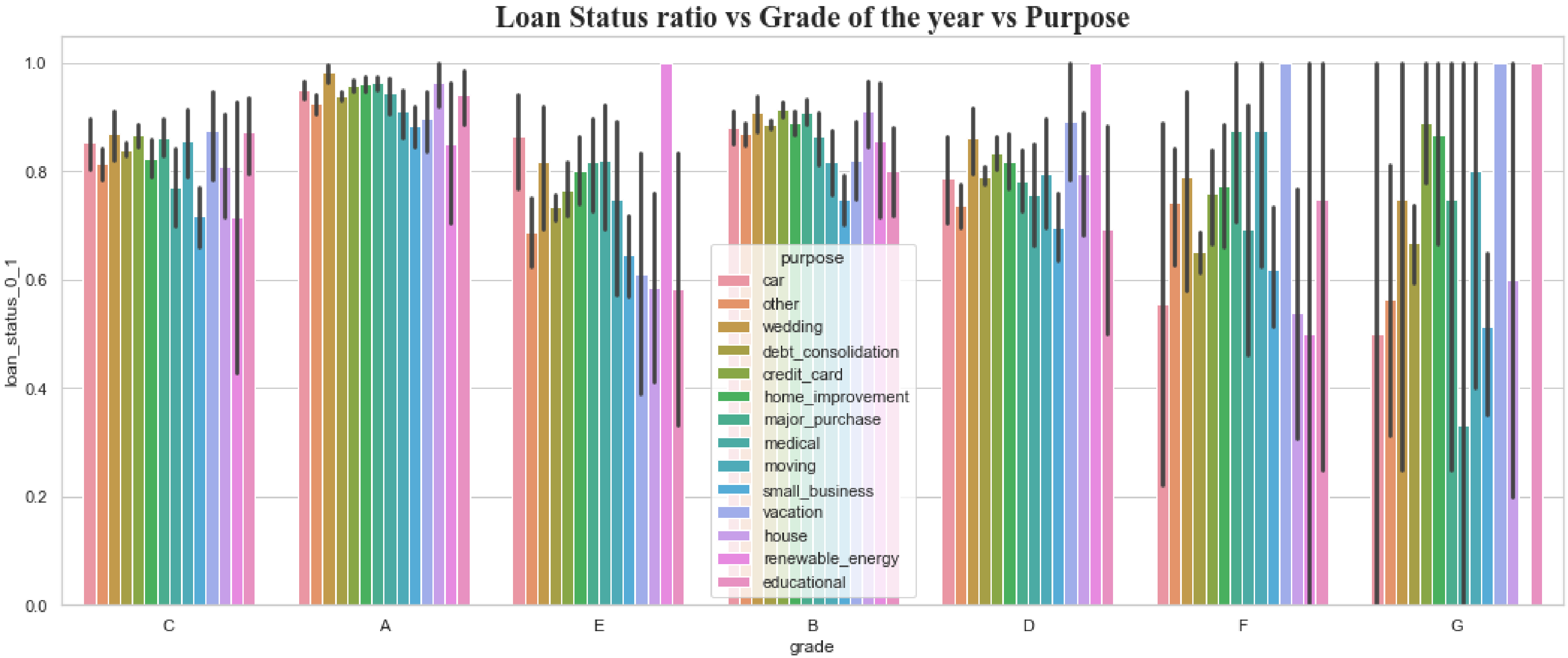
- ➢ Increase in Charged Off loans with increase in year.
- ➢ Increase in employment years leads to increase in annual income
- ➢ Higher the annual income higher the loan amount
- ➢ Higher the interest rate higher charged off ratio
- ➢ Intrest rate is increasing with loan amount increase which results in high charged off

Loan Status Ratio vs Issue Date of the year vs Purpose



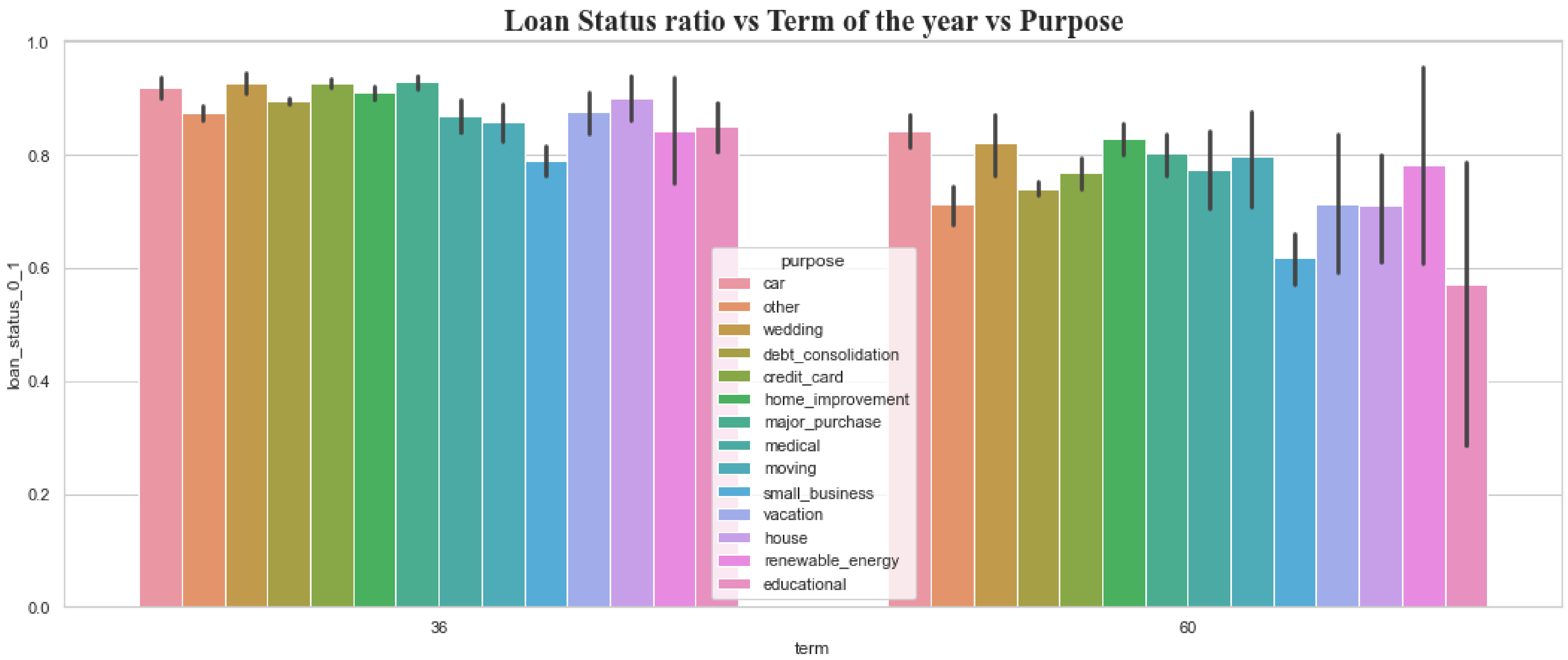
- **Here we can clearly see that in last bivariant analysis on issue_d_year stating that**
- From 2009-2011 Default percentage increased each year is more than paid percentage.
- From 2007-2009 default percentage increased each is less than paid percentage. here we can clearly see that vacation, house, renewable energy, medical, moving has decreased from 2010-2011 and car loans has increased from 2010-2011

Loan Status ratio vs Grade of the year vs Purpose



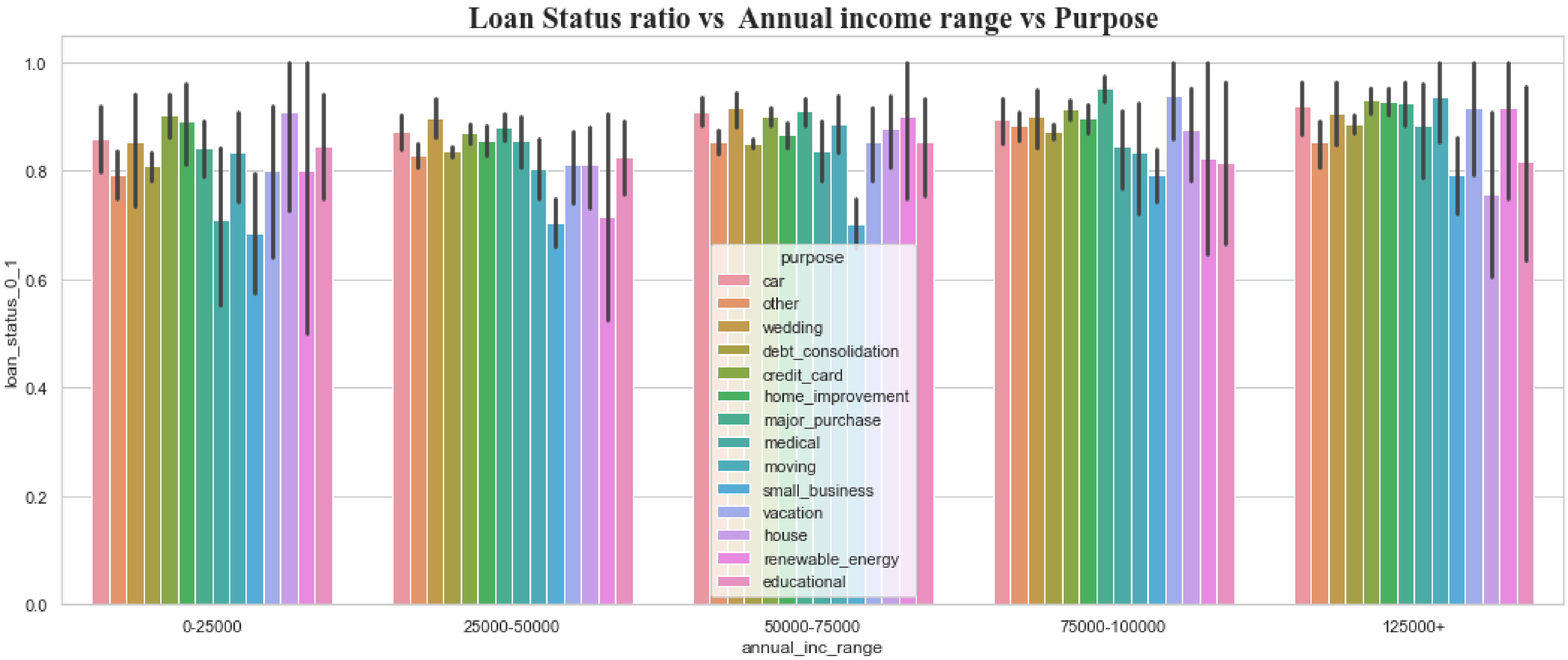
- Here, we can see most of the higher grade will be default as that line is on the peak on grade 6-7.

Loan Status ratio vs Term of the year vs Purpose



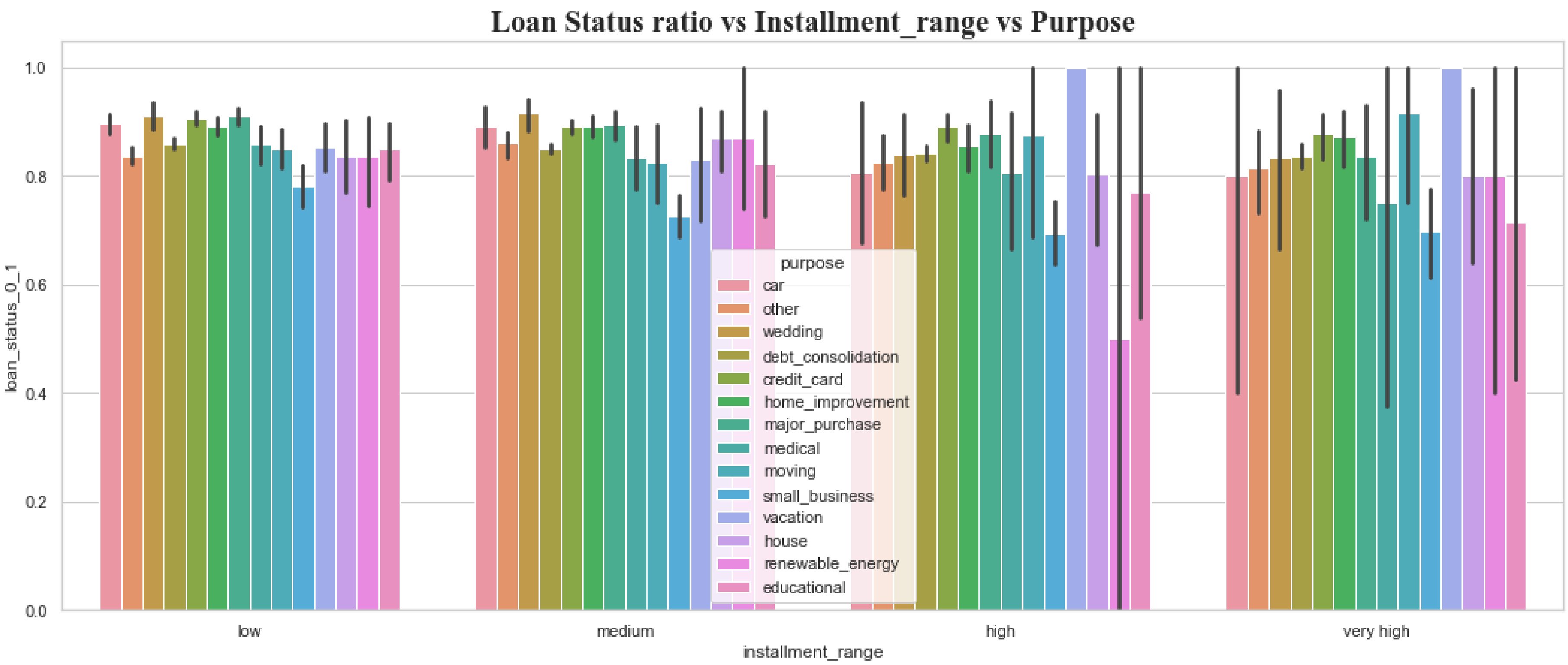
In term, term 60 have more default compare to term 36. So its better to give loan to term 36 than 60

Loan Status ratio vs Annual income range vs Purpose



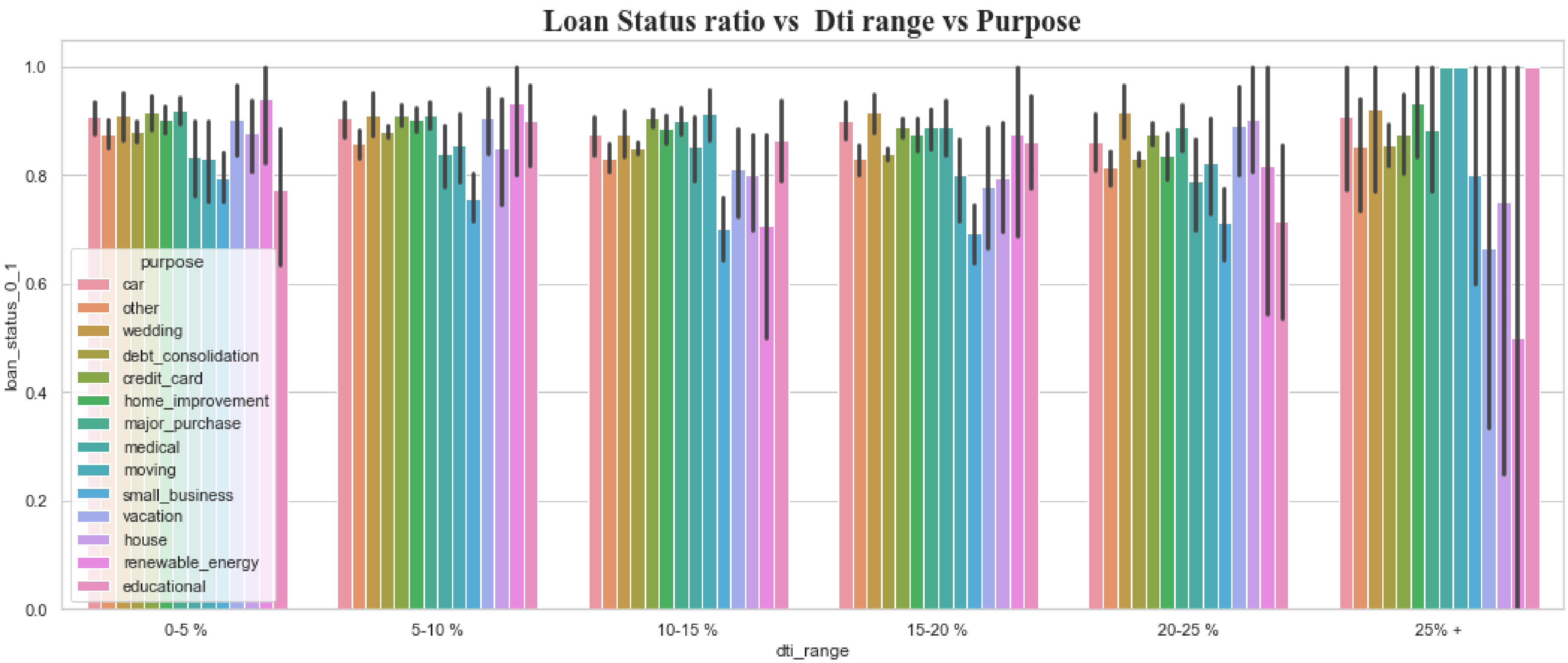
- If the Annual income range are from 0-25k are likely to be default on small business, renewable energy and medical.
- And between 25k-50k will fail to pay small business and renewable energy.
- However, if the income range is between 50k-75k then are likely to not able to pay small business loan

Loan Status ratio vs Installment_range vs Purpose



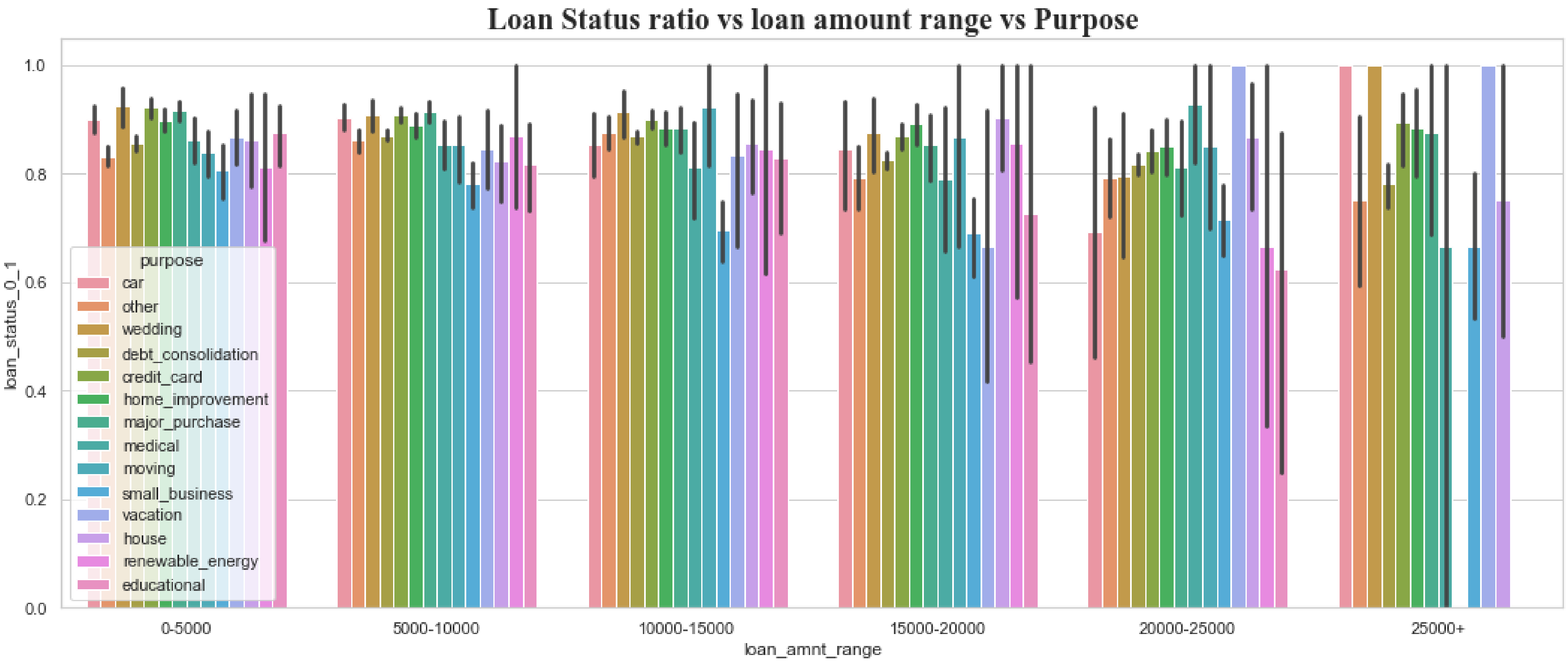
- For Installment range high have higher chance to be default, specailly on renewable energy, education, medical, major purchases, house, and moving.
- For Installment range very high have high chance to be default on cars, education, wedding, small buisness, and major purchases.

Loan Status ratio vs Dti range vs Purpose



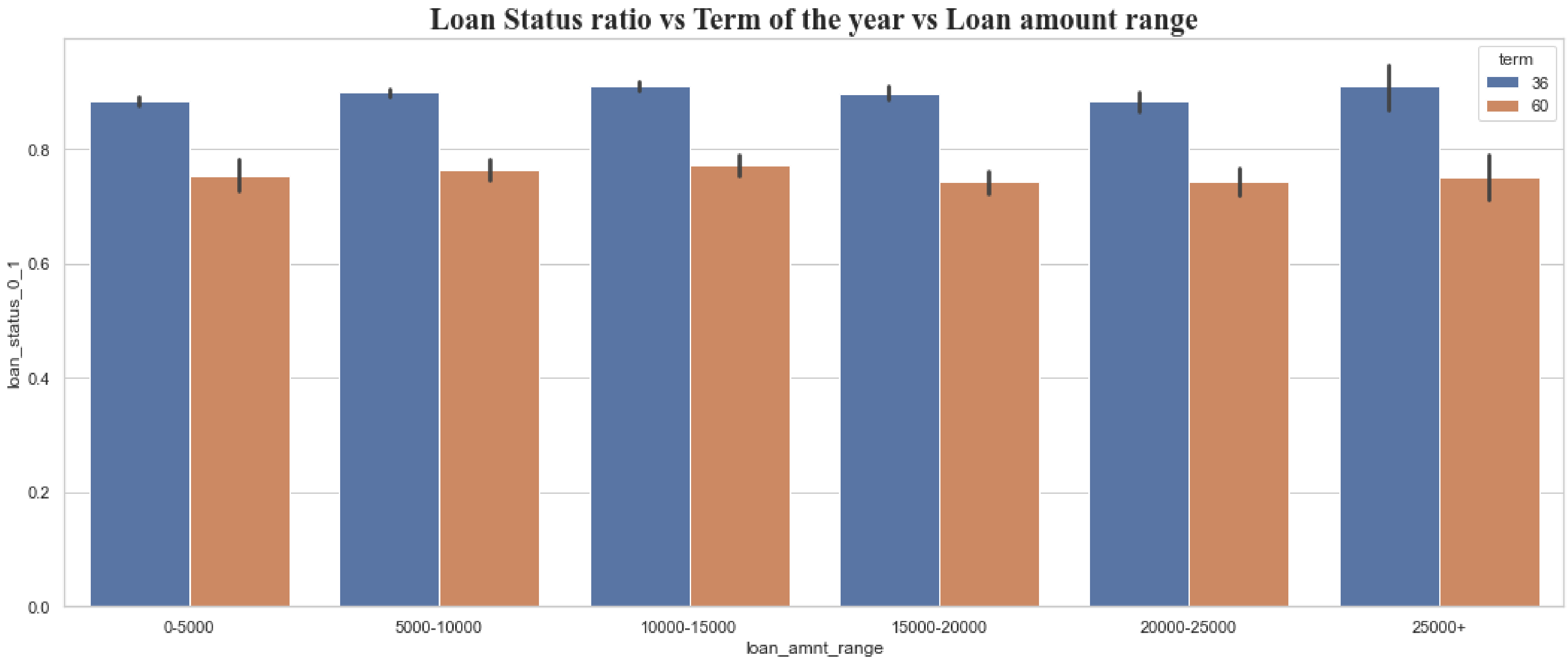
- If the dti is above 25% then person is likely to become default, specially on small business, vacation, house, renewable energy and home improvement. However they will be able to pay loan on moving, medical and education.
- On 20-25% they will be mostly not able to pay loan on education, and renewable energy.
- On 15-20% they will be default on vacation, house, education, and renewable energy.
- On 10-15% they will be default on renewable energy.

Loan Status ratio vs loan amount range vs Purpose



- Here, we can say that people wo take loan between 15k to 25k+ are likey to be default.
- Specially on education, small_buisness, renewable energy, cars, and vacation.

Loan Status ratio vs Term of the year vs Loan amount range



- We can see that loan amount range from 25k+ are most likely to be default for both 36 and 60 term.
- And also term as 60 has higher chance to be default.

Summary:

<u>Based our analysis done we can conclude the below mentioned points</u>:

- Small Business Applicants have high chances of getting charged off.
- Charged off proportion increases with grades moving from “A” towards “G”.
- Charged off proportion increases as Interest Rate Increases.
- Higher the public bankruptcy record greater the charged-off proportion.
- Those who already have Derogatory Public Records have higher charged off chances than others.
- Charged off applicants are more who had taken loan for 36 months as compared to 60 months.
- The percentage of Charged Off loans increases substantially as we go up the loan amount

<u>Suggestions</u>:

- Reducing the number of approvals where purpose is small business
- Loan approval should be avoided for those who already have Public Bankruptcy Records.
- Start charging higher interest rates for loans with debt to income ratio greater than 20
- Max amount committed to grade C to G should be reduced since they contribute the most to loan defaulting compared to grade A and B.
- Lower annual income applicants should be avoided for big loan amounts with higher interest Rates.